Technical Bulletin

COBOL for MVS Migration Schedule

Number: 261
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Section/Groups:
Submitted By: Farrell D. Wiser
Approved By: Jim Calaway

Technical Bulletins #228 and #246 document the different COBOL environments in which the State of Utah can use the COBOL language. (A copy of each of these bulletins is appended to the end of this document). Note that the "old" and "older" COBOLs have been unsupported by IBM for several years. Only "COBOL for MVS and VM" is currently supported by IBM.

In an effort to prevent future confusion and processing difficulties, and to allow the State of Utah to progress into, and beyond, the year 2000, the following steps will be taken to move to a "Year 2000 Compliant" COBOL environment at the State of Utah.

On Sunday, August 23, 1998, the following two changes will occur for CPU0, 1, 5, 6, and 7. On Sunday, September 20, 1998, the following two changes will occur for CPU2, 3, and 4:

- The "COBOL For MVS" product will become the "default'' for CPU0,1,5,6,7 for production, development, and testing (i.e., it will be in the "LINKLIST," along with the appropriate LE/370 library).

- Processes using other than "COBOL For MVS" will have to use "//STEPLIB DD" statements to access the proper COBOL libraries for their processing (i.e., any COBOL libraries that are now in the "LINKLIST" will be removed).

All of the "old" COBOL libraries for "OS/VS COBOL" and "VS/COBOL II" are still available (via a "//STEPLIB DD") on the same DASD as is currently the case. They are:

OS/VS COBOL
SYS1.VSCLLIB
SYS1.VSCOLIB

VS/COBOL II
- SYS1.COB2CICS
- SYS1.COB2CLIB
- SYS1.COB2COMP
- SYS1.COB2LIB
- SYS1.COB2MLIB
- SYS1.COB2PLIB
- SYSX.COB2WTR.LIB

There have been no changes to the PROClibs involved. SYS1.Proclib, SYSP.proclib, and SYSR.proclib, have not been altered in any way. Your "old" PROCs are as before.

Technical Bulletin

COBOL and the Year 2000

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Section/Groups: Security and Software Support
Submitted By: Farrell Wiser
Approved By: Clair Christensen

This technical bulletin is meant to explain what the 'YEAR2000' problem is, and how it can be addressed in the COBOL world.

First we must define the problem:

For decades, (or since the beginning of the use of computers to handle business data) most programs have been written to use just 2 digits to represent the 'year' (IE:'95', for '1995'). This came about because of the cost of resources (memory and disk, or tape) to store the data, and other similar reasons (in the 60's, and 70's, the year 2000 was a LONG way off). The result is that 2-digit year date values are EVERYWHERE. ALL of them will be WRONG on January 1, 2000 (IE: year 2000 = '00', which is LESS than year 1999 = '99')! Thus the 'YEAR2000 Problem' can be defined as: 'using 2-digit year values for dates'. The only long-term solution is to use 4-digit year values (IE: '1995' for 1995) for all year values in dates.

IBM COBOL as available to the State of Utah comes in 3 products:

1. The oldest is OS/VS COBOL (IBM product number 5740-CB1), sometimes also referred to as COBOL I (and occasionally as OS COBOL, or VS COBOL!). This COBOL supports the ANSI 74 standard. Application code created with this product exists in many applications at the STATE. IBM stopped marketing this product in June of 1992, and discontinued service in June of 1994. There is NO provision in this product for 4-digit year values. ANY application developed with this product WILL NOT deal with the YEAR2000 problem without MAJOR re-writing wherein the application deals with the needed 4-digit year value, since the date arithmetic in this COBOL can only use 2-digit year values! Those applications that currently do their own date arithmetic can change to a 4-digit year value by changing their logic, and definitions, and data bases. The applications that use COBOL to do the date arithmetic are exposed to all of the '2-digit year' problems.

   OS/VS COBOL - uses data sets: SYS1.VSCLLIB, SYS1.VSCOLIB

2. The mainframe IBM COBOL in current use is 'VS COBOL II' (IBM product number 5668-958, Version 2,Release 3.), sometimes also referred to as 'COBOL II', or even 'VS COBOL'.

This COBOL supports the ANSI 85 standard. This product was withdrawn from marketing by IBM, and will discontinue service support on June 30, 1996. All of the problems with 2-digit year values that existed in the 'old' COBOL, also exist in this COBOL.

VS COBOL II - uses data sets: SYS1.COB2CICS, SYS1.COB2CLIB, SYS1.COB2COMP, SYS1.COB2LIB, SYS1.COB2MLIB, SYS1.COB2PLIB, SYSX.COB2WTR.LIB - (on SYLIB7)

3. The newest IBM COBOL is 'COBOL for MVS & VM' (IBM product number 5688-197, Version 1, Release 2), previously announced by IBM as 'IBM COBOL/370'. This product is not yet installed at the State of Utah. This product directly supports 4-digit year values, as well as all of the other 'new' features (Object Oriented code, DCE (Distributed Computing Environment), an interface to the related group of COBOLs for OS/2, AIX, OS/400, etc.). This COBOL uses the LE/ 370(Le banguage Environment, IBM Product number 5688-198) product interfaces for the 'run time' libraries (LE/370 is currently installed at the State of Utah). This COBOL normally requires no source code changes to be made to re-compile existing VS COBOL II application source. Once an application is re-compiled, and running with 'COBOL for MVS & VM' (using the LE/370 Run Time libraries), an application can use the 'Century Window' feature of LE/370 to deal with 2-digit to 4-digit year conversions until the databases and applications can be updated to directly use 4-digit year values.

   Data Set Names= 'DP.IBM.IGY.V1R2M0.**' (For theCOBOL part)
   = 'DP.IBM.EQAW.V1R2M0.**' (for the DEBUG part)
   IBM Product # 5688-197 (Version 1, Release 2, Mod 0 = 1.2.0)

There are several IBM documents that supply greater detail on this subject. They are available from IBM directly, or from ITS: (the ITS contact is Farrell Wiser, at 538-3083; the IBM contact is George Van Tuyl, at 328-6879)

1. Solving the YEAR 2000 problem with COBOL and LE/370. (12 pages)
2. Technical Advantages of LE/370 and COBOL/370 (COBOL for MVS). (6 pages)
3. Why Migrate to COBOL/370 (COBOL for MVS) and LE/370? (32 pages)
4. The YEAR 2000 and 2-digit Dates: Executive Summary. (4 pages)
5. The YEAR 2000 and 2-digit Dates:A Guide for Planning and Implementation. (100+ pages) IBM Form # GC28-1251.
6. The IBM COBOL Family. (31 pages)
7. IBM COBOL for MVS & VM Environment. (33 pages)
8. COBOL Newsletters: JAN 94, MAY 94, NOV 94, OCT 95. (4 to 8 pages each)

Technical Bulletin

COBOL for MVS, with LE/370, and COBOL Report Writer

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Section/Groups: ITS Systems Programming.
Submitted By: Farrell Wiser
Approved By: Clair Christensen

The State of Utah has installed the following IBM Products that will have an impact on COBOL applications. All three of these products have been installed on each of the SYSPLEXes at the State of Utah. There is one set of them for use on CPUs 2,3,4 (SLC). Another set for use on CPU0,1,5,6 (Richfield), and another set for use on the Year2000 test machine (CPU7, also in Richfield). Each set of them has been differentiated by the Catalog in which they exist (see the details in each item # below). Because of the existence of older versions of COBOL, it is necessary to use '//STEPLIB', and '//SYSLIB', and '//PROCLIB JCLLIB ORDER=(DP.COBMVS.SIGYPROC)' DD statements to implement their use for testing, at present.

1. COBOL for MVS and VM.

IBM product # 5688-197, V1R2M0. This is the IBM COBOL that is Year 2000 compliant. It has no run-time libraries. The run-time library functions are provided by item #2 in this document. It also (like it's predecessor VS COBOL II) has no Report Writer functions. They are provided by item #3 in this document.

'COBOL for MVS' (or COBOL/MVS) uses libraries of a 'DP.COBMVS.*' form on CPUs 0,1,2,3,4,5,6,7.... Remember that the SLC site, and the Richfield sites, each use different Catalogs, so even though the data set names are the same, there are THREE sets of these data sets, one complete set for each of the sites.

Their names and contents are listed below:

'DP.COBMVS.*' for SLC and Richfield:

Name	Contents/use/etc.
SEQACLIS	CLIST and REXX Examples (DEBUG only)
SEQAIENU	WORKSTATION Information (English) (DEBUG tool)
SEQAMOD	DEBUG tool Modules (DEBUG tool)

SEQAOS2	WORKSTATION Modules (DEBUG tool)
SEQAPROC	DEBUG tool 'PROCs' (DEBUG tool)
SEQASAMP	DEBUG tool samples (DEBUG tool)
SEQA2ENU	WORKSTATION Modules (English) (DEBUG tool)
SIGYCLST	CLISTs (Compiler)
SIGYCOMP	COMPILER and DEBUG Modules (a LINKLIB)
SIGYMAC	OPTION Macros (Compiler)
SIGYPROC	Cataloged Procedures (Compiler)
SIGYSAMP	Sample Programs (Compiler)

There are twelve data sets in all.

An Example of the JCL to COMPILE, LinkEdit, and RUN, a COBOL program, using the new COBOL, LE370, RptWtr, follows. It is based on 'DP.COBRW.SCXRJCL(CXRTEST)'.

```
******************************** Top of Data ************************
//xxxxxx   JOB   (Xxxxx), etc...
//*-------------------------------------------------------------------------------
//* PRECOMPILE TEST PROGRAM:
//*-------------------------------------------------------------------------------
//*
//RWCOMP   EXEC PGM=IGYCRCTL,REGION=2048K,
//     PARM=('NODYN,OBJ,QUOTE,RES,LIB',
//    'EX(INX("LGSEQ",RW),PRTX(RW))')                < ===== Needed for Report Writer
only...
                   ("LGSEQ" <== TWO single quotes, NOT a DOUBLE quote ")
//STEPLIB  DD   DISP=SHR,DSN=DP.COBRW.SCXRPREC        < ===== For Report Writer
only...
//             DD   DISP=SHR,DSN=DP.COBMVS.SIGYCOMP
//             DD   DISP=SHR,DSN=DP.LE370.SCEERUN
//SYSIN     DD   DISP=SHR,DSN=DP.COBRW.SCXRCOBQ(CXRIVP01)
//SYSUT1   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT2   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT3   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT4   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT5   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT6   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT7   DD   UNIT=SYSDA,SPACE=(460,(700,100))
//SYSUT11  DD   UNIT=SYSDA,SPACE=(516,(1600,100))
//SYSLIN    DD   DSN=&&OBJ,DISP=(,PASS)
//SYSPRINT DD   SYSOUT=*
//*-------------------------------------------------------------------------------
//* LINK EDIT TEST PROGRAM:
```

```
//*-------------------------------------------------------------------------
//*
//LKED     EXEC PGM=IEWL,PARM='LIST,MAP'
//SYSLIB   DD   DISP=SHR,DSN=DP.COBRW.SCXRRUN   < ===== Needed for Report
Writer only...
//             DD   DISP=SHR,DSN=DP.LE370.SCEELKED
//SYSLIN   DD   DSN=&&OBJ,DISP=(OLD,DELETE)
//SYSUT1   DD   UNIT=(SYSDA,SEP=(SYSLMOD,SYSLIN)),SPACE=(1024,(200,20))
//SYSPRINT DD   SYSOUT=*
//SYSLMOD  DD   DSN=&&PGM(CXRIVP01),DISP=(,PASS),SPACE=(23200,(5,2,1))
//*
//*-------------------------------------------------------------------------
//* RUN TEST PROGRAM:
//*-------------------------------------------------------------------------
//*
//RUN      EXEC PGM=CXRIVP01,REGION=2M
//STEPLIB  DD   DSN=&&PGM,DISP=(OLD,DELETE)
//             DD   DISP=SHR,DSN=DP.COBRW.SCXRRUN     <==== Needed for Report Writer
only....
//             DD   DISP=SHR,DSN=DP.LE370.SCEERUN
//SYSOUT     DD   SYSOUT=*
//CALENDAR DD   SYSOUT=*
//* END OF JCL STEPS.
********************************** Bottom of Data **************************
```

If PROCs are being used, then the new PROC names to use are: (with the appropriate DD statements)

Original	New
*** OS/VS COBOL ***	
COB2UC ==>	IGYWC Found In 'DP.COBMVMS.SIGYPROC'
COB2UCG ==>	IGYWCG
COB2UCL ==>	IGYWCL
COB2UCLG ==>	IGYWCLG
COB2ULG ==>	
==>	IGYWCPL
==>	IGYWCPLG
==>	IGYWPL
*** VS COBOL II ***	
COBUC ==>	IGYWC
COBUCG ==>	IGYWCG
COBUCL ==>	IGYWCL

```
COBUCLG    ==>    IGYWCLG
COBULG  ==>
        ==>    IGYWCPL
        ==>    IGYWCPLG
        ==>    IGYWPL
***Report Writer***
COBRWC     ==>    COBRWC  *          Found in 'DP.COBRW.SCXRJCL'
COBRWCL    ==>    COBRWCL  *
COBRWCLG ==>    COBRWCLG *
*** VS COBOL II w/Report Writer ***
COB2RC  ==>    COBRWC *
COB2RCL==>    COBRWCL *
COB2RCLG   ==>    COBRWCLG *
```

* = In Release 4 the precompilation process is turned inside out with the compiler calling the precompiler. The EXEC statement is therefore: (See the example above, as well)

```
//   EXEC  PGM=IGYCRCTL,PARM='EX(INX(RW),PRTX(RW)'
```

In addition, you need a SYSUT11 workfile (similar to SYSUT1) and you need to include both the precompiler loadlib (DP.COBRW.PRECLIB) and the LE/370 runlib (DP.LE370.SCEERUN) in your //STEPLIB (or //JOBLIB).

There's an example of compilation JCL in 'DP.COBRW.SCXRJCL(CXRCOMP) with some useful comments. 'SPCRWCOB' is used if you want the precompiler to operate like the SQL or CICS preprocessor, as a separate step.

2. Language Environment for MVS and VM (LE370)

IBM Product # 5688-198, V1R5M0. This product supplies the run-time routines for COBOL, C, C++, PL/I, and FORTRAN.

LE/370 uses libraries of a 'DP.LE370.*' form on CPUs 0,1,2,3,4,5,6,7. Again, remember that the Catalogs point to 'different' data sets.

Their names and contents are listed below:

'DP.LE370.*' for SLC, and for Richfield:

Name	Contents/use/etc.
MACLIB	Assembler and Options macros
SAFHFORT	FORTRAN common names (L/M lib)

SCEECICS	CICS Support of DYNAMIC COBOL only (L/M lib)
SCEECLST	CLISTSs AND REXX EXECs
SCEECMAP	CHARmap source (NL resource only)
SCEECPP	Prelinker input decks for C/C++ functions
SCEEGXLT	GENXLT source (NL Resource only) (L/M lib)
SCEEH.ARPA.H	C/C++ Header files
SCEEH.H	C/C++ Header files
SCEEH.NET.H	C/C++ Header files
SCEEH.NETINT.H	C/C++ Header files
SCEEH.SYS.H	C/C++ system header files
SCEELKED L/M	LE/370 Static routines (L/M lib)
SCEELOCL	Locale source (NL resource only)
SCEELOCX	Compliant Locale source (NL Resource only)
SCEEMSGP	Prelinker messages
SCEEOBJ	Prelink object (OpenEdition extensions)
SCEEPROC	LE/370 PROCs (LINK EDIT, ASSEMBLE, etc)
SCEERUN	Dynamic routines (a linklib) (L/M lib)
SCEESAMP	LE/370 Samples
SCEESPC	C/C+++ System Programmer Facility (C/C++ only)
SCEESPCO	Object decks for SPC library (C only)
SIBMCALL	PL/I PLICALLA/B (PL/I only) (L/M lib)
SIBMMATH	PL/I math services (PL/I only) (L/M lib)
SIBMTASK	PL/I multitasking (PL/I only) (L/M lib)

There are 25 data sets in all.

An Example of the JCL to COMPILE, LinkEdit, and RUN, a COBOL program on any CPU, using the new COBOL, LE370, RptWtr, is provided in item #1 above.

PROCedure names, etc, are also provided in item #1 above.

3. COBOL Report Writer

IBM product 5797-DYR, V1R4M0 (from SPC SYSTEMS Limited). This product provides the 'Report Writer' functions in COBOL programs.

There are three sets of 'DP.COBRW.*' data sets, one on the SLC CPUs , one for CPUs 5 and 6 in Richfield, and one for CPU7 in Richfield.

DP.COBRW.SCXRCOBA' - Source for the COBOL routines with the 'APOST' option...
DP.COBRW.SCXRCOBQ' - Source for the COBOL routines with the 'QUOTE' option....
DP.COBRW.SCXRJCL' - Supplied JCL to use the product (Examples, PROCs, etc)...
DP.COBRW.SCXRPREC' - Pre-Compiler for the product....

DP.COBRW.SCXRRUN' - Run-Time load module library...

There are five data sets in all.

An Example of the JCL to COMPILE, LinkEdit, and RUN, a COBOL program on any CPU, using the new COBOL, LE370, RptWtr, is provided in item #1 above.

PROCedure names, etc, are also provided in item #1 above.

Additional information regarding the use of these products is available from the following sources:

A. IBM manuals

COBOL for MVS and VM.

IBM COBOL Language Reference	IBM Form # SC26-4769
IBM COBOL for MVS & VM Programming Guide	IBM Form # SC26-4767
IBM COBOL for MVS & VM Diagnosis Guide	IBM Form # SC26-3138
IBM DEBUG tool Users Guide and Refereence	IBM Form # SC09-2137
IBM COBOL for MVS & VM Compiler and Run-Time Migration Guide	IBM Form # GC26-4764
IBM COBOL for MVS & VM Installation and Customization under MVS	IBM Form # SC26-4766
COBOL OnLine Publications CD ROM	IBM Form # SK2T-2399

(On the LAN Via BookMangager in Bookshelf = IGYMS000)

Language Environment for MVS & VM (LE370).

Language Environment for MVS & VM Concepts Guide	IBM Form # GC26-4786
Language Environment for MVS & VM Programming Guide	IBM Form # SC26-4818
Language Environment for MVS & VM Programmng Reference	IBM Form # SC26-3312
Language Environment for MVS & VM Run-Time Migration Guide	IBM Form # SC26-8232
Language Environment for MVS & VM Writing Interlanguage Communication Applications	IBM Form # SC26-8351
Language Environment for MVS & VM OnLine Product CD	IBM Form # SK2T-2389

(On the LAN Via BookMangager in Bookshelf = CEE5S004)

COBOL Report Writer.

COBOL Report Writer Precompiler Programmers Manual	IBM Form # SC26-4301
COBOL Report Writer Precompiler Installation and Operation	IBM Form # SC26-4302
TNL to COBOL Report Writer Pub SC26-4301	IBM Form # SN68-1287

B. Contact ITS Systems Programming. Via the 'HELP DESK' @ 538-3440